

Astrobiology News July 2015: *New Horizons'* Encounter with Pluto

After a 9.5-year and 3-billion-mile voyage, the *New Horizons* spacecraft made its closest approach to Pluto on July 14th. In part due to low transmission rates from Pluto, the spacecraft will be sending data back to Earth for more than a year after it has finished collecting it¹, so anticipate hearing about some exciting discoveries this fall and in 2016. Meanwhile, the spacecraft has been sending back awesome images showing features as small as one-half mile across, and this intriguing dwarf planet is already displaying several surprises!

Scientists on the *New Horizons* team have determined that Pluto is roughly 1,473 miles in diameter (about the distance my family recently drove to watch my daughter compete and medal in the USA Karate National Championships in Ft. Lauderdale the week of the encounter!) This makes Pluto the largest known world in the Kuiper Belt², which is a vast ring of icy bodies beyond the orbit of Neptune³. Pluto is still considered a dwarf planet because it doesn't have enough gravitational pull to clear the neighborhood around its orbit of debris, which is one criterion for "planethood" set by the International Astronomical Union.⁴ Pluto does, however, have a nitrogen-rich atmosphere, which extends as far as 1,000 miles above its surface, is being stripped away by the solar wind, producing a "tail" of cold, ionized gas extending thousand of miles beyond Pluto.

One big surprise is the apparent "youth" of a mountain range near Pluto's equator. Planetary geologists estimate the icy mountains formed no more than 100 million years ago, based on the lack of craters in the vicinity, which suggests the region may be geologically active today. With a diameter approximately equal to the distance between Chicago and Boulder, Colorado, a large heart-shaped feature on Pluto also reveals a craterless plain that appears to be no more than 100 million years old. Note that the age of surface features on a planet is not the same as the age of the planet. While the worlds of our Solar System (planets, moons, asteroids, etc.) formed about 4.6 billion years ago, many processes, operating on different timescales, can be important in reshaping the surface features of a given world. Small worlds with no significant source of internal or external heating are typically geologically "dead" and present heavily cratered surfaces that remain relatively unaltered with the passage of time. The source of active geologic activity on Pluto is puzzling, since Pluto isn't being heated by gravitational interactions with a much larger planet, as, for example, the icy moons of Jupiter.

¹ <http://blogs.agu.org/wildwildscience/2015/07/13/this-is-why-you-have-not-seen-a-bunch-of-images-of-pluto-this-weekend/>

² in size, but not mass

³ The orbit of Pluto actually crosses the orbit of Neptune.

⁴ <http://www.iau.org/news/pressreleases/detail/iau0603/>

Pluto's moons appear to be equally intriguing. The entire Pluto system, including the orbits of Pluto's 5 moons, Charon, Styx, Nix, Kerberos, and Hydra, would fit between the Earth and moon nearly three times.⁵ Thus far, *New Horizons* has sent back detailed images of Charon (Pluto's largest moon), which suggest its surface has also been reshaped by geologic activity. Unlike Pluto and Charon, which are massive enough to be round due to gravity, the smaller moons Nix and Hydra might best be described as having the shapes of a jelly bean and the state of Michigan, respectively.

Fans of the legendary rock group *Queen* may be interested to know that lead guitarist and astrophysicist, Dr. Brian May, spent his birthday with the *New Horizons* science team and produced some stereo images of Pluto with the Geology, Geophysics and Imaging team⁶!

Until next month,

Grace

Grace Wolf-Chase, Ph.D. (gwolfchase@adlerplanetarium.org)

⁵ <http://news.nationalgeographic.com/2015/07/150714-pluto-flyby-new-horizons-space-planets/>

⁶ <http://www.nasa.gov/feature/rock-starastrophysicist-dr-brian-may-goes-backstage-with-new-horizons>